

## 1.21 VENOUS THROMBOEMBOLISM

Venous thromboembolism (VTE), or clotting within the venous system, is a common and underrecognized cause of significant preventable morbidity and mortality in hospitalized patients. VTE includes deep vein thrombosis (DVT) and pulmonary embolism (PE). Each year, 300,000 to 600,000 Americans are affected by VTE.<sup>1-3</sup> VTE is a serious condition that carries a substantial risk of mortality and long-term complications such as chronic venous insufficiency, major bleeding during anticoagulation therapy, and recurrent disease. Annually, VTE may be responsible for more than 100,000 deaths in the United States, and it is the most common preventable cause of hospital death.<sup>3-7</sup> Hospitalists can lead their institutions in the development of screening and prevention protocols for patients at risk for VTE and in the promotion of early diagnosis and safe treatment approaches. Hospitalists can also develop strategies to operationalize cost-effective programs that will improve patient outcomes and reduce the economic burden of VTE.

**KNOWLEDGE**

*Hospitalists should be able to:*

- Describe VTE pathophysiology, including contributing aspects of endothelial damage, stasis, and alteration of the coagulation cascade.
- Describe the epidemiology of VTE, including the effects of demographic, environmental, thrombophilic, and hormonal factors, underlying medical and surgical conditions, and length of stay.
- Explain the clinical presentation of VTE and describe the algorithmic diagnostic approach.
- Describe the indications, accuracy, and limitations of specific diagnostic tests.
- Explain when invasive testing, including pulmonary angiography and venography, is indicated and list the contraindications and potential complications of such testing.
- Recognize indications and poor prognostic factors that necessitate early specialty consultation, which may include interventional radiology, vascular surgery, and hematology.
- Describe VTE prophylaxis regimens for specific hospitalized risk groups including medical, general surgical, orthopedic, neurosurgical, obstetric, and critically ill patients.
- Explain the indications for hospitalization and admission to the intensive care unit.
- Explain the indications, contraindications, and adverse effects of thrombolytic therapy in the setting of VTE.
- Explain indications, contraindications, mechanisms of action, and reversal agents for pharmacologic drugs used to treat VTE.
- Explain the role and potential adverse effects of other therapeutic modalities in the setting of VTE, including different anticoagulation regimens, vena caval interruption, thrombolysis, and embolectomy.
- Describe the risk of adverse outcomes from VTE.

- Describe the risks and potential harm associated with pressure gradient stockings.
- Recognize when to prescribe postdischarge prophylaxis.
- Explain goals for hospital discharge including specific measures of clinical stability for safe care transitions.

**SKILLS**

*Hospitalists should be able to:*

- Elicit a thorough and relevant medical history and review the medical record to identify relevant risk factors and symptoms consistent with VTE.
- Perform a complete physical examination to identify clinical features that predict the presence of VTE and significant clot burden, including evidence of pulmonary hypertension, right heart failure, low perfusion state, and underlying malignancy.
- Analyze history and physical findings to determine pretest probability for DVT and/or PE.
- Integrate evidence-based diagnostic testing to establish the diagnosis or exclusion of VTE or need for additional testing strategies.
- Assess the need for urgent invasive treatment modalities including thrombolysis or embolectomy.
- Determine the appropriate level of inpatient care required.
- Formulate a treatment plan tailored to the individual patient including selection of a specific anticoagulation regimen or suitable alternative therapy.
- Anticipate and address factors that may complicate VTE or its management including cardiopulmonary compromise, bleeding, and/or anticoagulation failure.
- Address and manage pain, dyspnea, and swelling in patients with VTE.
- Perform VTE risk assessment in all hospitalized patients and initiate indicated prophylactic measures, including pharmacologic agents, mechanical devices, and/or ambulation to reduce the likelihood of VTE.
- Facilitate comanagement of VTE treatment and prophylaxis when requested by other services.
- Educate clinicians and nurses in VTE risk assessment and preventive measures.
- Communicate with patients and families to explain the natural history and prognosis of VTE.
- Communicate with patients and families to explain tests and procedures and their indications and to obtain informed consent.
- Communicate with patients and families to explain the use and potential adverse effects of pharmacologic agents.
- Communicate with patients and families to explain the goals of care, discharge instructions, and management after hospital discharge to ensure safe follow-up and transitions of care.
- Prescribe treatments to decrease the risk of postthrombotic syndrome upon hospital discharge.

- Ensure adequate resources, including monitoring of anticoagulation, for patients between hospital discharge and arranged outpatient follow-up.
- Document the treatment plan and provide clear discharge instructions for postdischarge clinicians responsible for monitoring anticoagulation.
- Advocate for the establishment and support of postdischarge resources, including patient education, adequate availability of pharmacologic agents, and postdischarge follow-up monitoring and care.
- Lead, coordinate, and/or participate in initiatives to ensure appropriate use of mechanical and pharmacologic prophylaxis.
- Lead, coordinate, and/or participate in initiatives that limit the inappropriate use of VTE prophylaxis.
- Integrate outcomes research, institution-specific laboratory policies, and the hospital formulary to create evidence-based and cost-effective diagnostic and management strategies for patients with VTE.

### ATTITUDES

*Hospitalists should be able to:*

- Employ a multidisciplinary approach, which may include nursing, anticoagulation, pharmacy, and nutrition services, to the care of patients with VTE that begins at admission and continues through all care transitions.
- Follow evidence-based recommendations when managing hospitalized patients at risk for VTE or those who have acute VTE.
- Work collaboratively with primary care physicians and emergency physicians in making admission decisions.

### SYSTEM ORGANIZATION AND IMPROVEMENT

*To improve efficiency and quality within their organizations, hospitalists should:*

- Lead, coordinate, and/or participate in multidisciplinary initiatives to implement screening and prevention protocols for hospitalized patients on the basis of national evidence-based recommendations.
- Lead, coordinate, and/or participate in multidisciplinary teams to develop early treatment protocols.
- Lead, coordinate, and/or participate in multidisciplinary initiatives to improve inpatient care efficiency, facilitate early discharge, and encourage the outpatient management of VTE.

### References

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3. U.S. Department of Health and Human Services. The Surgeon General's Call to Action to Prevent Deep Vein Thrombosis and Pulmonary Embolism. 2008.
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